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The impact of a conditional cash transfer programme on determinants of child health: evidence from Colombia

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Conflict of interest

The authors declare that they have no conflicts of interest.

Authorship

SLA and MA were responsible for the study conception, design, analysis and interpretation of the data, as well as the drafting of the article. AB and FJvL intensively revised the manuscript.

Ethical statement

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by a local institutional ethics committee. Adults provided signed informed consent to participate in the study. Data from the evaluation are made publically available by the Planning Department of the Colombian Government with no identifiable information on survey participants (https://www.dnp.gov.co).

Abstract

Objective: Conditional cash transfer (CCT) programmes provide income to low-income families in return for fulfilling specific behavioural conditions. CCT's have been shown to improve child health, but there are few systematic studies on their impact on multiple determinants of child health. We examined the impact of a CCT programme in Colombia on (a) the use of preventive health services; (b) food consumption and dietary diversity; (c) mother's knowledge, attitudes and practices about caregiving practices; (e) maternal employment; and (d) women´s empowerment.

Design: Secondary analysis of the quasi-experimental evaluation of *Familias en Accion* Programme. Children and families were assessed in 2002, 2003 and 2005/6. We applied a difference-in-differences approach using logistic or linear regression, separately examining effects for urban and rural areas.

Setting: Colombia.

Subjects: children (n=1,450) and their families in 31 treatment municipalities were compared to 1,851 children from 65 matched control municipalities.

Results: Familias en Accion was associated with a significant increase in the probability of using preventive care services (OR= 1.85, 95% CI 1.03, 3.30) and growth and development check-ups (β= 1.36, 95% CI 0.76, 1.95). It had also a positive impact on dietary diversity and food consumption. No effect was observed on maternal employment, women´s empowerment, and knowledge, attitudes and practices about caregiving practices. Overall, FA impact was more marked in rural areas.

Conclusion: CCTs in Colombia increase contact with preventive care services and improve dietary diversity, but they are less effective in influencing mother's employment decisions, empowerment, and knowledge of caregiving practices.

Key words: *conditional cash transfers programmes, poverty, intervention, income, health, nutrition*

Introduction

Conditional cash transfer (CCT) programmes seek to reduce poverty in the short term, and to break intergenerational transmission of poverty (1-3) by requiring parents to meet certain conditions related to health and/or educational components (4, 5). CCT programmes often require that mothers fulfil a schedule of regular primary health care visits for pre-school children, such as adherence to vaccination, growth monitoring and attendance to informative sessions and they require that children regularly attend school (6-9).

Studies worldwide have demonstrated large impacts of CCT programmes on child education, health and nutritional outcomes directly associated with pre-specified conditions (further referred to as 'conditionalities') (2, 5, 10, 11). For example, the Mexican *Oportunidades* programme increased the number of growth monitoring visits by 60% in rural areas (11), and by 52% in urban areas (5); and CCT programmes in Colombia (12, 13) and Honduras (14) have been shown to increase adherence to child immunization schemes, all of which may translate into improvements in health (15). Despite the wide range of evidence on child health, the impact of CCT programmes on well-known 'determinants' of child health has been less well explored or evidence has been mixed or inconsistent (10, 16-21). In particular, it is not well established whether CCT's only influence the use of health and education services associated with programme conditionalities, or whether CCT programmes have wider impacts on behaviours, attitudes and social factors determinants that may contribute to better child health (7). For example, most CCT programmes transfer money to the mother in the household, and through this mechanism they may increase women´s decision making power in relation to child health and well-being. CCT programmes may also influence mother´s employment decisions, and improve knowledge and awareness of caregiving practices. So far evidences of effects of CCTs on these behaviours are mixed and inconsistent (10, 16-21).

'*Familias en Accion*' (Families in action) is the conditional cash transfer programme in Colombia and includes both a health and an educational component. The health component provides cash to mothers of poor households on the condition that children younger than 7 years regularly attend growth and development check-ups as well as vaccination programmes, and mothers attend educational workshops on nutrition, hygiene and contraception. For the education component, children aged 7-17 years must also regularly

attend school for at least 80% of the school year. Families with children aged 7-17 receive around 14,000 Colombian pesos (around US$ 5.5) for every child attending primary school and 28,000 Colombian pesos (around US$11) for every child attending secondary school (22). All transfers are delivered to the mother in the household. Early evidence from FA suggests that the programme was associated with a 16.5% increase in the purchase of protein-rich foods, as well as with increased height for age (0.16 Z-score) among the youngest and poorest children. In addition, the programme reduced symptoms of diarrhoea and increased rates of DPT vaccination (13, 23-26). Yet, there is limited evidence on the impact of the programme on other determinants of child health not directly associated with the specific behavioural conditions, such as mother's employment, empowerment and knowledge of caregiving practices.

In this study, we estimate the impact of the FA CCT programme in Colombia on a range of child health determinants including use of preventive health services; food consumption and diet diversity; attitudes, knowledge and practices about child caring; maternal employment; and women´s empowerment. We focus on families with children younger than 7 years, as this represents a critical period of development that may have implications for outcomes later in life (27). Initial reports suggested that the FA programme had stronger effects in rural areas, where access to health facilities is generally lower than in urban settings (13, 23). Therefore, we also examine whether CCTs in Colombia have different effects across rural and urban areas.

Methods

The FA programme

Eligibility for the CCT programme is determined based on a scoring system known as the System for Identifying and Selecting Beneficiaries (SISBEN), a survey of low-income households used to derive a poverty score that ranges from 0-100 and enables targeting social welfare programmes (22, 28). Implementation of the programme includes operational units at the national, departmental and municipality levels. The programme is managed and implemented by a National Coordinating Unit, but Regional Coordinating Units in each department manage the programme and liaise with the national and municipal government. Programme monitoring is a joint responsibility of departmental and municipality governments and includes a comprehensive monitoring system that follows families through the various stages of programme implementation, such as: 1) beneficiaries´ registration and status, 2) compliance with programme conditionalities, 3) payment of transfers, and 4) complaints and case management (28). Municipal Liaison Offices verify that mothers meet the conditions. If a mother fails to meet the requirements three consecutive times, she could be dismissed from the programme.

For the present study, we used data from the evaluation of the FA programme (12). The evaluation of the programme was carried out by the Institute of Fiscal Studies, an independent research institute in London (United Kingdom), using a matched-control design (12). At the beginning, the programme was targeted geographically. Of the 1,060 municipalities in Colombia, 622 qualified for the programme based on their fulfilment of several conditions, which required municipalities to have: 1) a population smaller than 100,000 inhabitants; 2) the health and education infrastructure to guarantee programme implementation; 3) a bank to enable cash transfers; and 4) up-to-date census, welfare and service infrastructure data. The evaluation is based on a detailed survey carried out in 122 municipalities with a baseline assessment in 2002 and follow-up assessments in 2003 and 2005-06. For the survey, a stratified and probabilistic sample of 57 treatment municipalities representative of the 622 eligible municipalities was selected. These municipalities were matched to 65 control municipalities, based on similarities to treatment municipalities in

observed characteristics. In practice, except for the requirement to have a bank, control municipalities were comparable to treatment municipalities in all other assessed dimensions. Further details of the evaluation are available elsewhere (12).

Assessments were carried out through a household survey among participants in both control and treatment municipalities. In addition, data on municipal services supply was collected based on a survey among health centres and schools. In 2002, baseline assessments were scheduled to take place before the programme started, but due to political pressure, the programme started before in 26 out of the 57 treatment municipalities. Because no baseline data were available for them, we focused on the 31 treatment municipalities with assessments prior to programme implementation. Children under 7 years in treatment (n= 2,394) and control (n= 3,197) groups were randomly selected. A first follow-up assessment was carried out in 2003 and included 2,010 treated children and 2,606 control children who had previously been measured in 2002. A second follow-up assessment was carried out between 2005 and 2006, and included 1,450 and 1,851 children in both control and treatment areas who were evaluated in 2002 and 2003. They were considered as the final sample for this analysis. Children lost to follow-up were slightly older (5.1 vs 4.4 years, p value <.0001) and their families reported lower use of health services and attendance to educational workshops. However, children and mothers lost to follow-up were similar to those that remained in the sample in terms of sex, maternal and municipality characteristics investigated (Supplementary table S1).

We examine the impact of the CCT programme on determinants of child health. Figure 1 shows a diagram that summarizes the outcomes assessed and how we hypothesize they may relate to programme exposure and child health. We examine impacts on outcomes that were associated with programme conditionalities such as use of health care services and workshop attendance, but also on outcomes such as women's empowerment, which were not directly required in order to receive the cash transfers, but may have changed as a result of the CCT programme.

Outcomes

Use of health care services was measured by asking mothers whether they had visited child healthcare services in the last year (yes/no) for attending the growth and development check-ups for children younger than 10 years, which was one of the conditions to receive the cash transfers. The number of check-ups was also collected. This information was available in the baseline and in the first follow-up household surveys.

Workshop attendance. Mothers were asked about their attendance (yes/no) to specific educational workshops on nutrition, diarrhoea control, prenatal care, and management of acute respiratory infections, in the six months prior to the survey. This information was collected for each workshop in each follow-up; information about the nutrition workshop was available only in the baseline and the first follow-up.

Child dietary intake was collected by asking mothers if their children consumed certain foods (yes/no) and how often they did during the seven days preceding the survey (12). The food items were classified into eight food groups which included: (1) cereals, roots and tubers; (2) fruits; (3) vegetables; (4) legumes and nuts; (5) meat and poultry; (6) fish; (7) dairy; and (8) eggs. The evaluation of dietary adequacy was assessed by creating a simple dietary diversity score (DDS) that is widely recognized as a key indicator of diet quality (29, 30). We added the total number of days each of the eight food groups was consumed in the previous week. The sum of the number of days could range from 0 to 56. Based on previous application(31),we created tertiles of DDS to classify children into low, average and high diversity, using the following cutoffs (low 0-15; average 16- 21; high 22- 56).

Women's empowerment. One of the expectations of CCT programmes is that by putting resources in the hands of poor women, the programme will promote gender equality within the household, resulting in large development payoffs. To assess this, mothers were specifically asked to report who decides when to take a child to the doctor if sick and how much is spent on food. For each decision there were four possible answers 1) only the father decides; 2) only the mother decides; 3) both decide; 4) other members of household decide. We collapsed this information into two categories: 1) mother or both decide, 2) father or others decide.

Maternal employment. Women were asked to report to which activity they spend most of their time during the previous week. We reclassified responses as to identify two groups:

(a) women in the labour market, which included women currently at work; women in the labour force but temporarily not working; and women in the labour force but currently unemployed and looking for work; (b) women who were out of the labour market, including women retired, studying, homemakers, and the disabled.

Women´s knowledge, attitudes and practices. Mothers were asked to provide information about their knowledge, attitudes and practices concerning diarrhoea and fluids replacement and diarrhoea and food consumption at each follow-up. We dichotomised each answer into a value of one if the mother´s answer was correct, and zero otherwise.

Control variables

Covariates at the individual, household and municipality levels were used as control variables. Children's individual characteristics included age, sex and whether the child was participating in *Hogares comunitarios,* a home-based childcare programme for children from poor families. We controlled for maternal characteristics including mother's educational attainment, marital status, and age. Mother's highest level of education completed was categorized into: 1) no education, 2) incomplete primary, 3) completed primary, 4) incomplete secondary, 5) completed secondary and 6) higher education. Covariates also included household size and household income, measured by asking respondents their income from all sources in the past month, including wages, salaries, retirement benefits, help from relatives, and rent from property. To account for differences in the number of household members, gross income was equivalised by dividing all household income by the square root of household size(32). In regression models, household income was log transformed to account for non-linearities. At the municipality level, models included number of inhabitants, level of urbanization (urban/rural), availability of health care services, and geographic location (Central, Caribbean, Pacific or Eastern region).

Ethical approval for the evaluation study was granted by a local institutional ethics committee. Adults provided signed informed consent to participate in the study. Data from the evaluation are made publically available by the Planning Department of the Colombian Government with no identifiable information on survey participants (https://www.dnp.gov.co)

Statistical methods

We used a difference-in-differences (DID) approach, an analytical method that compares changes between baseline and follow-up between treatment and control, rather than differences in post-treatment outcomes only. The DID estimate is based on the difference in outcome in the treatment group before and after treatment minus the difference in outcome in the control group over the same period. The assumption is that the change observed in the control group is a good counterfactual of the change we would have observed in the treatment group if they had not been exposed to the programme, because this removes biases in post-treatment comparisons between the treatment and control group that could be the result from permanent differences between those groups, as well as biases from comparisons over time in the treatment group that could be the result of trends (33). This approach has been commonly applied in the evaluation of CCT programmes in different countries (34, 35).

To assess the quality of the DID approach, the "common trend assumption" should be tested. The common trend assumption means that the outcome variable would have evolved in the same way between baseline and follow-up in both treatment and control municipalities had the FA program not taken place. Although we could not test this assumption because we did not have data for the outcomes in our study prior to enrolment, an indirect test was performed to examine trends prior to program implementation. We used data sources provided by the national statistics agency (DANE), which collects and harmonizes data on all mortality information (under-5 mortality rate) from all regions. We estimated trends in under-5 mortality rates and urbanization in control and treatment municipalities between 1997 and 2001, before the program started. Trends in these indicators of health and living conditions were similar prior to the program (p value >0.05), therefore this provides an indication that the common trend assumption holds (Data not shown).

We used linear regression to model continuous outcomes and logistic regression to model dichotomous outcomes. For a continuous outcome variable *y* and individual *i,* we estimated the following model:

$$Y_{it} = \beta_0 + \beta_1 treat_i + \beta_2 wave_{it} + \beta_3 treat_i * wave_{it} + \beta_3 X_i + \varepsilon_{it}$$

Where t=0 if the period is the baseline assessment (2002), and t=1 if it is a follow-up assessment (2003or 2006); *treat* is equal to 1 if the individual lived in a treatment municipality and 0 otherwise; and *X* refers to a vector of individual, household and municipality baseline variables. β_3 isan interaction term between treatment and wave, which measures the difference in trends before and after the programme between treatment and control, the DID estimate of interest.

We carried out all analyses separately for urban and rural areas, given prior evidence that effects may differ by level of urbanization (12, 13, 23). All analyses were performed using SAS software 9.3. We incorporated appropriate sample weights to account for differential selection probabilities. We estimated robust standard errors clustered at the municipality level in an intention- to-treat analysis.

Results

At baseline, the children´s mean age was 4.4 years in treatment municipalities and 4.5 years in control municipalities. The use of health services was higher in the treatment than in the control group. In rural areas, mothers participated less in educational workshops in treatment than in control municipalities. In urban areas, children in treatment municipalities consumed fewer vegetables than in control municipalities. Mothers in treatment municipalities had also higher empowerment and knowledge regarding childcare decisions than mothers in control municipalities. In rural areas, mothers in treatment municipalities had lower rates of labour force participation, but when employed worked more hours per week than mothers in control municipalities (Table 1).

Figure 2 summarises trends in healthcare services use, growth and development check-ups and educational workshops. Between 2002 and 2006, healthcare services use increased in the treatment group, while it remained constant in the control group. Enrolment and attendance to the growth and development check-ups substantially increased in the treatment group in the period between 2002 and 2003, while it did not change for children in the control group. Mothers´ attendance to educational workshops generally increased for the treatment group, while it declined in the control group between 2002 and 2006.

Figure 3 shows trends in food intake between 2002 and 2006. In the treatment group there was an increase in consumption of almost all food items. By contrast, there were no changes or smaller increases in the consumption of dairy products, meat, vegetables, eggs, and legumes for the control group. Fruit consumption declined in both treatment and control group. Those results were confirmed with the use of the dietary diversity score. At baseline, there were no differences in control and treatment groups However, in 2003 and 2006 there was an increase of the dietary diversity in the treatment group, resulting in almost half of the children in the treatment group from rural areas having a high dietary score. In contrast, more than 40% of children in the control group in rural areas remained at a low diversity score (Figure 4). Figure 5 shows that women's empowerment increased in both groups, with a slightly larger increase in the control group. There were no clear changes in labour force participation and working hours in either group.

Table 2 shows the estimates of DID analysis on the conditionalities. In rural areas the FA programme was associated with an increase in use of healthcare preventive services (OR= 2.63, 95% CI 1.31, 5.27). The FA programme increased attendance to the growth and development check-ups (OR= 5.09, 95% CI 2.88, 8.99) as well as the frequency of these check-ups (β= 1.36, 95% CI 0.76, 1.95) in both rural and urban areas. Likewise, the programme was associated with a higher mother´s attendance to educational workshops on diarrhoea (OR= 2.36, 95% CI 1.43, 3.92), prenatal care (OR=2.92, 95% CI 1.74, 4.89), and acute respiratory infections (OR=2.57, 95% CI 1.44, 4.60) in rural and urban areas. There was no effect on attendance to nutrition workshops.

In rural areas, children in treatment municipalities had larger increases in the consumption of meat, eggs and dairy products than children in control municipalities. The FA programme was associated with an increased dietary diversity among children in rural areas (OR= 2.13, 95% CI 1.25, 3.65).In urban areas, children in treatment municipalities experienced larger increases in the consumption of fish, eggs, and vegetables than children in control municipalities. Nonetheless, we did not find differences in the dietary diversity between control and treatment groups (OR= 1.42, 95% CI 0.85, 2.37). There was no evidence that the programme had any positive impacts on women's perceived decision making power within the household on issues related to child nutrition and care. If

anything, in rural areas the programme was associated with a decline in mother's involvement in decisions regarding child care (OR=0.90, 95% CI 0.83, 0.98). There was no evidence of an impact of the programme on labour force participation or working hours (Table 3).

Discussion

This study suggests that the FA programme increased the use of preventive healthcare services use, growth and development check-ups, and mother's participation in educational workshop, particularly in rural areas. The programme increased children's food consumption in both rural and urban areas, as well as dietary diversity among children in rural areas. This is consistent with previous studies in other countries such as Mexico, Nicaragua and Brazil, which have also found stronger effect in rural areas (8, 16, 35-38). On the other hand, we found no evidence that the programme had significant effects on maternal employment, women´s empowerment, and knowledge, attitudes and practices about caregiving practices.

The FA programme significantly increased the use of preventive health services. A possible explanation is that in the absence of a financial incentive, families prefer non-conventional, alternative medicines. Traditionally, 40% of Colombians use non-conventional or alternative medicines (39), while the use of health services is more related with the perception of a serious illness or injury(40). Similar results have been found in other countries. For example, in El Salvador, CCT beneficiaries reported to solve their acute episodes of illness at home at first instance and only attended health care services if complications arose(38).Although families in urban areas may have easier access to health centres and services than families in rural areas, the programme may not be sufficient to additionally incentivise these families to attend health services.

We found that the programme increased dietary diversity among children in rural areas. To our knowledge, only one study has assessed the effect of CCT programmes on household dietary diversity. This study showed that beneficiaries' households of cash transfers in Ethiopia had better household dietary diversity scores. However, this study was cross sectional and did not evaluated changes over time (41). Consistent with previous studies

(42, 43), we found that the programme increased consumption of some healthy foods that may be translated into an improvement of diet quality. However, we found a reduced intake of fruits, suggesting that food consumption is largely driven by a direct income effect rather than by improved nutritional knowledge and attitudes.

Our results suggest that the FA programme did not have effects on maternal employment. This is consistent with findings from Mexico's *Oportunidades* programme, which did not increase mother's employment rates but was also not a disincentive to work(21). These findings suggest that other structural or cultural factors that are not amenable to intervention through cash transfers may be more important determinants of maternal employment. For example, Colombian women´s labour participation has been associated with lack of access to childcare, local crime rates, lack of public transport services and low economic activity in region of residence(44).

We found no evidence that the FA programme improved women´s perceptions of their decision-making power related to child health and well-being, as suggested elsewhere(16). A possible explanation may be that transfers to mothers increased fear for potential conflict and domestic violence, and male partners may use this mechanism to preserve control over transferred money (18). In Zimbabwe, for example, women who participated in a CCT programme reported that they did not feel free to make decisions by themselves due to fears of "family disintegration", and they continued with their traditional gender roles as child caretakers, while men maintained control over household decisions and budget (45).

Women living in treatment municipalities were more likely to attend educational workshops, but the latter were not effective in bringing about changes in knowledge and practices regarding child health and nutrition. Evidence from Mexico´s *Oportunidades* programme have also reported some problems with the educational sessions; for example doctors informed that although mothers attended to the workshops, many of them did not pay attention during the sessions. Likewise, cultural barriers also prevented doctors from discussing sensitive topics such as family planning and pap smear tests (46). This raises questions on the effectiveness of workshops as a way to improve mother's knowledge of caring practices.

Limitations

Despite several strengths, some limitations should be considered in our study. First, there was a 40% loss-to-follow-up due to the high mobility of participants. Difficulties in re-contacting participants partly reflect the unstable living conditions of a migrating workforce. Nevertheless, we found that children contacted at follow-up did not differ from those lost to follow-up with respect to several key baseline characteristics. Some of the outcomes measures may also have been influenced by biases (e.g. reporting, memory, perception).

A crucial assumption of the DID approach is that a similar trend between treatment and control should be observed if the FA programme had not taken place. Although the common trend assumption could not be tested directly, we found no significant differences in trends for under-5 mortality rates and urbanization rates between control and treatment municipalities before the programme started. While not conclusive, it is reassuring that treatment and control municipalities did not differ prior to treatment in these key outcomes.

Our study was based on a strong research design that aimed to ensure internal validity. However, whether results are externally valid and generalizable to other countries is difficult to assess. We expect our findings to be of relevance to other Latin American countries running similar programmes such as Ecuador and Brazil, but our findings may not be generalizable to countries in Asia where the political and socio-economic context may be substantially different.

Conclusion

The FA programme increased the use of preventive healthcare services and attendance to child growth and development check-ups. This suggests that CCT programmes may be efficient in improving child nutrition through growth and development check-ups as well as increasing access to preventive health services. Yet, the programme had no effects on other important determinants of child health such as women's empowerment, knowledge and attitudes, and women's employment rates. These findings cast some doubt on the notion that CCT programmes have 'spillover' effects in broader determinants of child health not directly associated with programme conditionalities. Our findings highlight the need to

develop CCT or other programmes that do not only influence behaviours directly associated with pre-specified conditions, but motivate households to further invest in other important determinants of child health and well-being.

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Table 1 Baseline characteristics, *Familias en Accion* conditional cash transfer programme, 2002

Characteristic	Control Rural n= 823	Treatment Rural n= 828	p-value	Control Urban n=1,028	Treatment Urban n=622	p- value
Child (Girls %)	51.3	48.6	0.22	48.3	49.5	0.56
Age, years (mean [SD])	4.5 (1.1)	4.4 (1.4)	0.18	4.5 (1.3)	4.4 (1.4)	0.27
Mother´s age, years (mean [SD])	31.6 (5.7)	32.4 (7.8)	0.19	31.5 (7.3)	31.7 (7.7)	0.85
Mother´s education						
Lowest or not education (%)	91.0	90.8	0.47	69.6	73.6	**0.02**
Municipality characteristics						
Population <5,000 inh. (%)	32.3	29.7	0.98	5.4	12.8	0.60
Population 5,000- 14,000 inh. (%)	35.9	39.1		30.4	25.2	
Population > 14,000 inh. (%)	31.8	31.2		64.3	61.9	
Atlantic region (%)	28.8	26.9	0.21	57.9	47.8	0.91
Eastern region (%)	29.4	18.6		12.7	14.8	
Central region (%)	21.6	36.0		22.5	30.6	
Pacific region (%)	20.2	18.5		6.9	6.9	
Healthcare centres by level of care						
Outpatient care(n [%])	34 (94.4)	20 (100)	0.53	15 (23.4)	6 (17.1)	0.46
Inpatient care (n [%])	2 (5.6)			49 (76.6)	29 (82.9)	
Conditionalities						
Healthcare services use (%)[a]	11.8	28.6	**0.001**	15.8	31.2	**0.001**
Registered in growth and development programme (%)[b]	20.7	48.6	**< 0.001**	22.4	57.9	**< 0.001**
Mother´s workshop attendance [c]						
Diarrhoea workshop (%)	19.9	16.6	0.42	27.9	27.3	0.90
Prenatal care workshop (%)	11.5	9.7	0.53	17.6	23.2	0.22
Acute respiratory infection (%)	15.8	13.2	0.49	19.3	20.6	0.77
Nutrition(%)	15.4	16.1	0.84	23.9	30.0	0.24
Behaviours not directly related toconditionalities						
Food consumption[d]						
Dairy products (%)	84.5	75.2	0.06	83.9	87.9	0.41
Meat (%)	77.1	77.1	0.99	78.4	83.7	0.37
Eggs (%)	76.7	73.3	0.52	79.6	73.1	0.08
Fish (%)	52.5	49.8	0.78	58.1	51.5	0.45
Legumes (%)	73.4	76.6	0.52	83.6	84.6	0.84

Vegetables (%)	52.8	56.2	0.56	66.9	55.6	**0.02**
Fruits (%)	82.9	83.9	0.85	82.8	83.4	0.90
Food diversity						
Low diversity	30.6	31.5	0.94	27.1	31.7	0.48
Average diversity	33.3	31.2		37.4	31.2	
High diversity	36.1	37.3		35.4	37.2	
Mother´s empowerment						
If a child is getting sick who decide to go to the doctor Mother or both decide *(%)*	80.3	93.5	**< 0.001**	78.5	95.6	**< 0.001**
Who decides how much is spent on food Mother or both decide *(%)*	49.6	59.7	0.13	54.5	69.3	**0.02**
Maternal employment *(%)*	22.8	18.0	0.39	29.2	35.6	0.17
Mother´s working hours (mean [SD])	12.2	20.0	**0.03**	25.5	22.5	**0.02**
Mother´s knowledge, attitudes and practices						
Increase fluids replacement during diarrhoea episode (%)	67.1	65.0	0.13	84.8	80.8	0.25
Received same quantity of food during diarrhoea episode (%)	26.1	34.1	0.05	38.1	35.3	0.64

[a]Health care services use: Did you use healthcare services in the last year?

[b] Are your child registered in growth and development programme?

[c] Did you attendance a workshop regarding prenatal care, diarrhoea treatment acute respiratory infections and nutrition prior six months?

[d] Did your child consume those food items in the prior week?

Table 2 Difference- in- differences (DID) estimate on to the conditionalities for control and treatment municipalities, *Familias en Accion*, Colombia, 2002-2006

Variables	Rural	Urban	All
Healthcare services use[a]			
Treatment vs control at baseline	**2.38 (1.07, 5.32)**	**2.50 (1.38, 4.55)**	**2.40 (1.35, 4.28)**
Time trend	0.81 (0.49, 1.33)	0.96 (0.55, 1.67)	0.91 (0.62, 1.34)
DID Estimate of FA programme	**2.63 (1.31, 5.27)**	1.31 (0.65, 2.66)	**1.85 (1.03, 3.30)**
Growth and development checks frequency[b,c]			
Treatment vs control at baseline	0.12 (-0.05, 0.29)	**0.58 (0.32, 0.85)**	**0.37 (0.19, 0.56)**
Time trend	**0.17 (0.08, 0.26)**	**0.17 (0.05, 0.29)**	**0.17 (0.08, 0.25)**
DID Estimate of FA programme	**1.36 (0.76, 1.95)**	**0.93 (0.37, 1.49)**	**1.17 (0.62, 1.71)**
Registered in growth and development programme[a,c]			
Treatment vs control at baseline	**3.10 (1.61, 5.96)**	**6.04 (3.29, 11.09)**	**4.63 (2.69, 7.97)**
Time trend	0.91 (0.65, 1.26)	0.87 (0.59, 1.28)	0.89 (0.66, 1.20)
DID Estimate of FA programme	**5.09 (2.88, 8.99)**	**3.80 (1.90, 7.62)**	**4.34 (2.51, 7.53)**
Mother´s attendance to workshops[a]			
Diarrhoea			
Treatment vs control at baseline	0.82 (0.49, 1.39)	1.06 (0.68, 1.65)	0.87 (0.58, 1.32)
Time trend	0.93 (0.70, 1.25)	0.44 (0.28, 0.69)	0.57 (0.38, 0.86)
DID Estimate of FA programme	**1.95 (1.16, 3.29)**	**2.22 (1.26, 3.91)**	**2.36 (1.42, 3.92)**
Mother´s attendance to workshops[a]			
Prenatal care			
Treatment vs control at baseline	0.79 (0.45, 1.39)	1.48 (0.83, 2.65)	1.08 (0.72, 1.63)
Time trend	0.73 (0.48, 1.12)	0.31 (0.17, 0.54)	0.42 (0.29, 0.62)
DID Estimate of FA programme	**3.01 (1.69, 5.37)**	**2.27 (1.09, 4.74)**	**2.92 (1.74, 4.89)**
Mother´s attendance to workshops[a]			
Acute respiratory infection			
Treatment vs control at baseline	0.78 (0.42, 1.44)	1.09 (0.66, 1.79)	0.92 (0.63, 1.35)
Time trend	0.52 (0.33, 0.83)	0.39 (0.17, 0.87)	0.43 (0.27, 0.70)
DID Estimate of FA programme	**2.69 (1.53, 4.72)**	2.25 (0.86, 5.89)	**2.57 (1.44, 4.60)**
Mother´s attendance to workshops[a,c]			
Nutrition			
Treatment vs control at baseline	1.12 (0.67, 1.89)	1.54 (0.86, 2.76)	1.24 (0.90, 1.72)
Time trend	0.65 (0.39, 1.07)	0.70 (0.32, 1.50)	0.74 (0.50, 1.07)
DID Estimate of FA programme	1.94 (0.96, 3.93)	1.06 (0.45, 2.51)	1.33 (0.84, 2.11)

[a]Values are odds ratios and 95% confidence interval (95% CI)
[b]Values are regression coefficients and 95% confidence interval (95% CI)
[c]Effect of FA programme in the first follow-up only
Variables included in the model: age, child´s sex, participation in *HogaresComunitarios* (home-based health care), mother's marital status, mother's age, mother's education, household income, level of urbanization, availability of health services, number of inhabitants and region

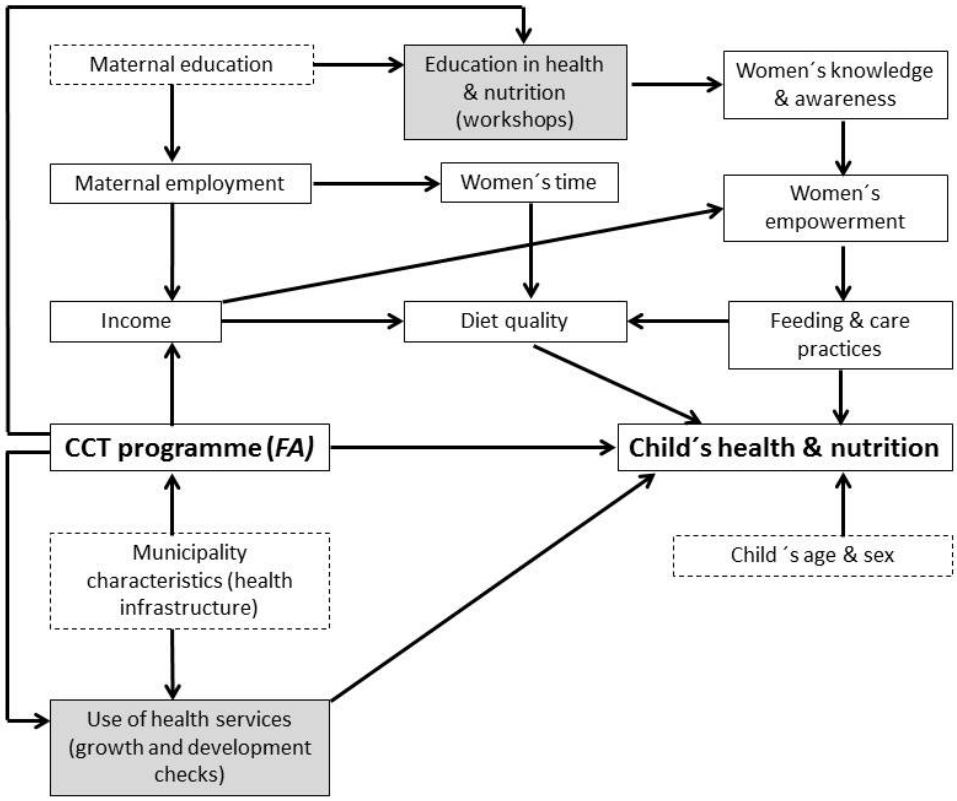
Table 3 Difference- in- differences (DID) estimate on other determinants for control and treatment municipalities, *Familias en Accion*, Colombia, 2002-2006

Variables	Rural	Urban	All
Food Consumption			
Meat[a]			
Treatment vs control at baseline	1.01 (0.66, 1.57)	1.57 (0.84, 2.96)	1.31 (0.84, 2.04)
Time trend	0.98 (0.70, 1.36)	0.89 (0.66, 1.21)	0.94 (0.72, 1.23)
DID Estimate of FA programme	**1.74 (1.02, 2.98)**	1.14 (0.65, 2.01)	1.48 (0.92, 2.37)
Fish[a]			
Treatment vs control at baseline	1.48 (0.60, 3.67)	0.75 (0.42, 1.34)	1.03 (0.55, 1.92)
Time trend	1.47 (0.82, 2.65)	1.00 (0.86, 1.17)	1.17 (0.89, 1.52)
DID Estimate of FA programme	0.94 (0.49, 1.80)	**1.40 (1.03, 1.91)**	1.19 (0.85, 1.64)
Eggs[a]			
Treatment vs control at baseline	0.93 (0.82, 1.06)	0.90 (0.82, 1.00)	0.92 (0.83, 1.02)
Time trend	1.04 (0.94, 1.15)	1.05 (0.99, 1.11)	1.05 (1.00, 1.10)
DID Estimate of FA programme	1.12 (0.96, 1.29)	**1.11 (1.01, 1.22)**	**1.11 (1.01, 1.22)**
Dairy products[a]			
Treatment vs control at baseline	0.95 (0.86, 1.05)	1.07 (0.98, 1.16)	1.01 (0.94, 1.09)
Time trend	0.97 (0.91, 1.02)	0.98 (0.89, 1.07)	0.97 (0.91, 1.04)
DID Estimate of FA programme	**1.22 (1.07, 1.40)**	1.04 (0.93, 1.17)	**1.13 (1.02, 1.26)**
Legumes[a]			
Treatment vs control at baseline	1.02 (0.89, 1.16)	1.02 (0.93, 1.12)	1.01 (0.92, 1.11)
Time trend	0.99 (0.88, 1.11)	0.97 (0.91, 1.04)	0.98 (0.92, 1.04)
DID Estimate of FA programme	1.12 (0.98, 1.27)	1.03 (0.92, 1.15)	1.08 (0.98, 1.19)
Vegetables[a]			
Treatment vs control at baseline	1.27 (0.83, 1.94)	0.65 (0.41, 1.02)	0.86 (0.60, 1.23)
Time trend	1.21 (0.77, 1.91)	**0.51 (0.34, 0.74)**	**0.72 (0.59, 0.86)**
DID Estimate of FA programme	1.01 (0.57, 1.80)	**1.90 (1.15, 3.13)**	**1.53 (1.06, 2.21)**
Fruits[a]			
Treatment vs control at baseline	1.26 (0.66, 2.40)	1.19 (0.69, 2.05)	1.19 (0.68, 2.07)
Time trend	**0.55 (0.44, 0.68)**	**0.45 (0.31, 0.67)**	**0.49 (0.38, 0.64)**
DID Estimate of FA programme	1.17 (0.67, 2.03)	1.00 (0.60, 1.68)	1.12 (0.73, 1.72)
Dietary diversity score			
Treatment vs control at baseline	1.04 (0.68, 1.58)	1.12 (0.68, 1.83)	1.03 (0.68, 1.55)
Time trend	0.76 (0.22, 1.29)	**0.55 (0.39, 0.76)**	**0.63 (0.54, 0.76)**

DID Estimate of FA programme	**2.13 (1.25, 365)**	1.42 (0.85, 237)	**1.91 (1.28, 2.85)**
Outcomes unrelated to conditionalities			
Mother´s decision on food[a]			
Treatment vs control at baseline	1.27 (1.04, 1.55)	1.23 (0.97, 1.56)	1.23 (1.01, 1.50)
Time trend	1.22 (1.03, 1.44)	1.25 (1.00, 1.56)	1.24 (1.04, 1.48)
DID Estimate of FA programme	0.90 (0.74, 1.08)	0.84 (0.66, 1.06)	0.86 (0.72, 1.04)
Mother´s decision on children care[a]			
Treatment vs control at baseline	1.17 (1.08, 1.26)	1.21 (1.00, 1.47)	1.19 (1.04, 1.37)
Time trend	1.11 (1.03, 1.20)	1.22 (1.00, 1.48)	1.18 (1.02, 1.36)
DID Estimate of FA programme	**0.90 (0.83, 0.98)**	0.83 (0.68, 1.02)	0.86 (0.74, 1.00)
Maternal employment[a]			
Treatment vs control at baseline	0.83 (0.50, 1.38)	1.36 (0.92, 2.02)	1.07 (0.75, 1.53)
Time trend	0.92 (0.65, 1.32)	0.98 (0.71, 1.35)	0.96 (0.78, 1.18)
DID Estimate of FA programme	1.08 (0.71, 1.64)	0.90 (0.57, 1.41)	0.97 (0.73, 1.29)
Mother´s working hours[b]			
Treatment vs control at baseline	1.43 (-1.14, 4.01)	0.13 (-3.57, 3.84)	0.43 (-1.97, 2.83)
Time trend	1.12 (-1.94, 4.17)	-0.18 (-3.40, 3.03)	0.43 (-1.20, 2.07)
DID Estimate of FA programme	-1.22 (-4.02, 1.57)	0.35 (-4.01, 4.72)	-0.25 (-2.52, 2.02)
Mother´s knowledge and awareness[a]			
Diarrhoea and food			
Treatment vs control at baseline	1.40 (0.91, 2.14)	0.89 (0.57, 1.40)	1.07 (0.76, 1.50)
Time trend	1.44 (1.06, 1.97)	1.01 (0.64, 1.58)	1.15 (0.82, 1.60)
DID Estimate of FA programme	0.72 (0.47, 1.11)	1.30 (0.73, 2.31)	1.00 (0.67, 1.50)
Mother´s knowledge and awareness[a]			
Diarrhoea and fluids			
Treatment vs control at baseline	0.93 (0.58, 1.52)	0.92 (0.56, 1.50)	0.86 (0.57, 1.30)
Time trend	1.22 (0.89, 1.67)	0.63 (0.43, 0.91)	0.85 (0.64, 1.13)
DID Estimate of FA programme	1.06 (0.69, 1.64)	1.18 (0.70, 1.99)	1.24 (0.82, 1.88)

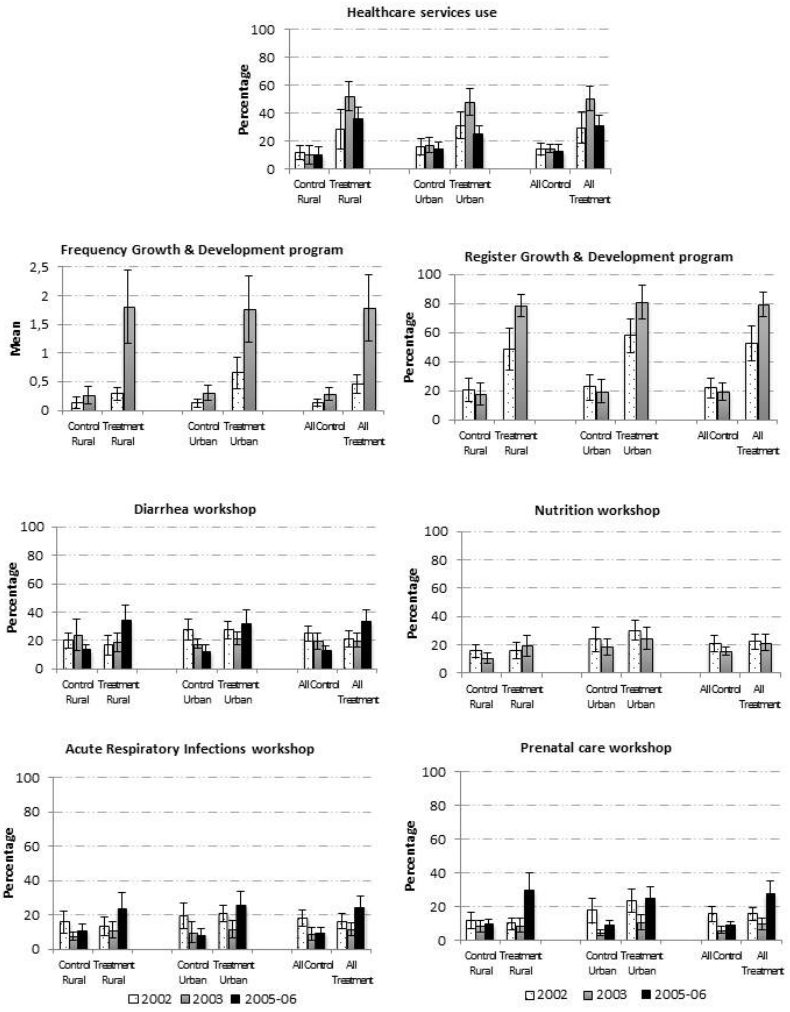
[a]Values are odds ratios and 95% confidence interval (95% CI)
[b]Values are regression coefficients and 95% confidence interval (95% CI)
[c]Effect of FA programme in the first follow-up only
Variables included in the model: age, child´s sex, participation in *Hogares Comunitarios* (home-based health care), mother's marital status, mother's age, mother's education, household income, level of urbanization, availability of health services, number of inhabitants and region

Figure 1 Diagram to identify variables that might affect child´s health and nutrition through the FA programme



Foot notes:
This diagram shows the impact of the CCT programme on multiple outcomes ranging from the conditionalities required to receive the transfers (shaded in grey) to more distal determinants (continuous line). It also includes potential confounders at the individual, household and municipality level (dashed borderline).

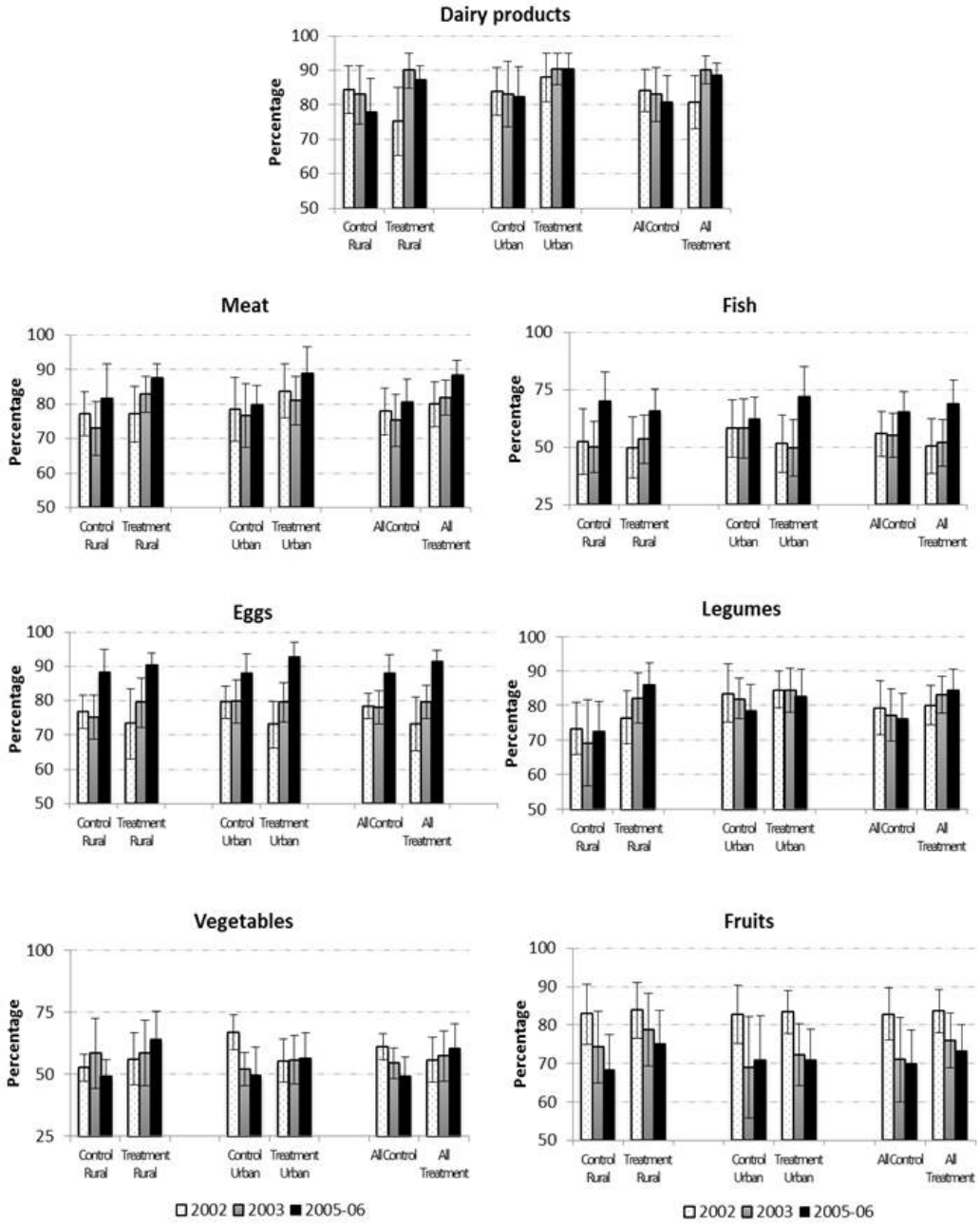
Figure 2 Trends on the conditionalities for control and treatment municipalities, Familias en Accion, Colombia, 2002-2006



Foot notes:

Error bars are 95% confidence intervals. Attendance to workshop refers to mother's attendance to workshop regarding nutrition, prenatal care, diarrhoea treatment and acute respiratory infections in the last six months.

Figure 3 Trends in child food consumption, Familias en Accion, Colombia, 2002-2006



Foot notes:

Error bars are95% confidence intervals

Meat Consumption: Pork, beef, chicken

Fish consumption: Fish, tuna, sardines

Eggs consumption

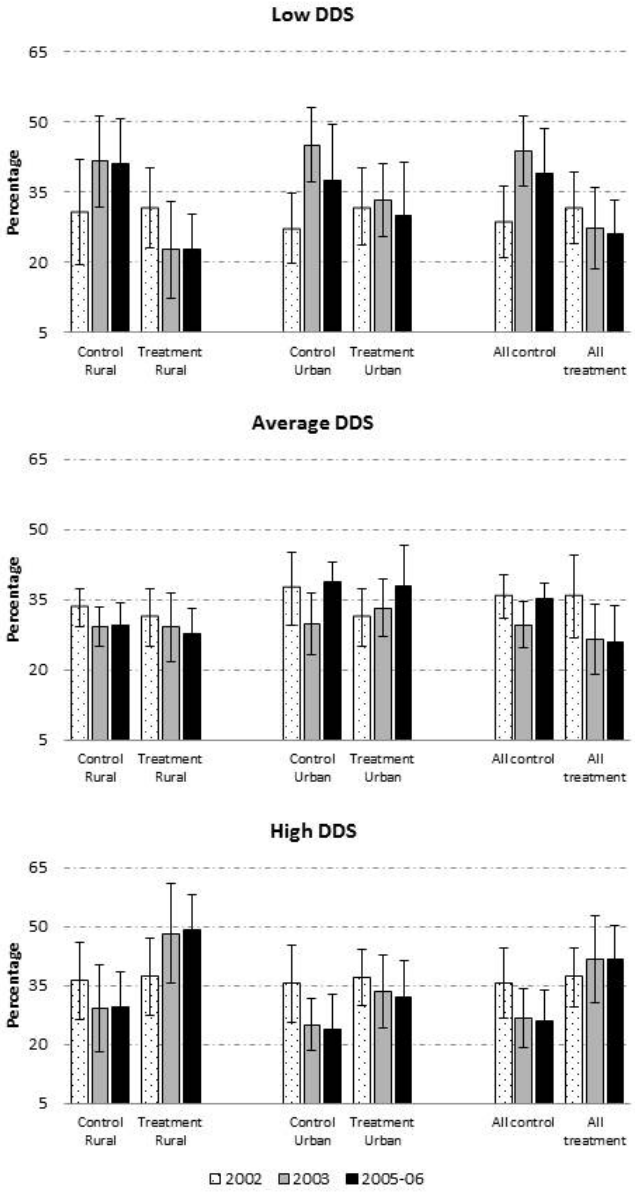
Dairy products consumption: Milk, cheese

Legume consumption: chickpeas beans, beans or lentils

Vegetable consumption: String beans, carrots, pumpkin, pepper, corn, mixed vegetables, eggplant.

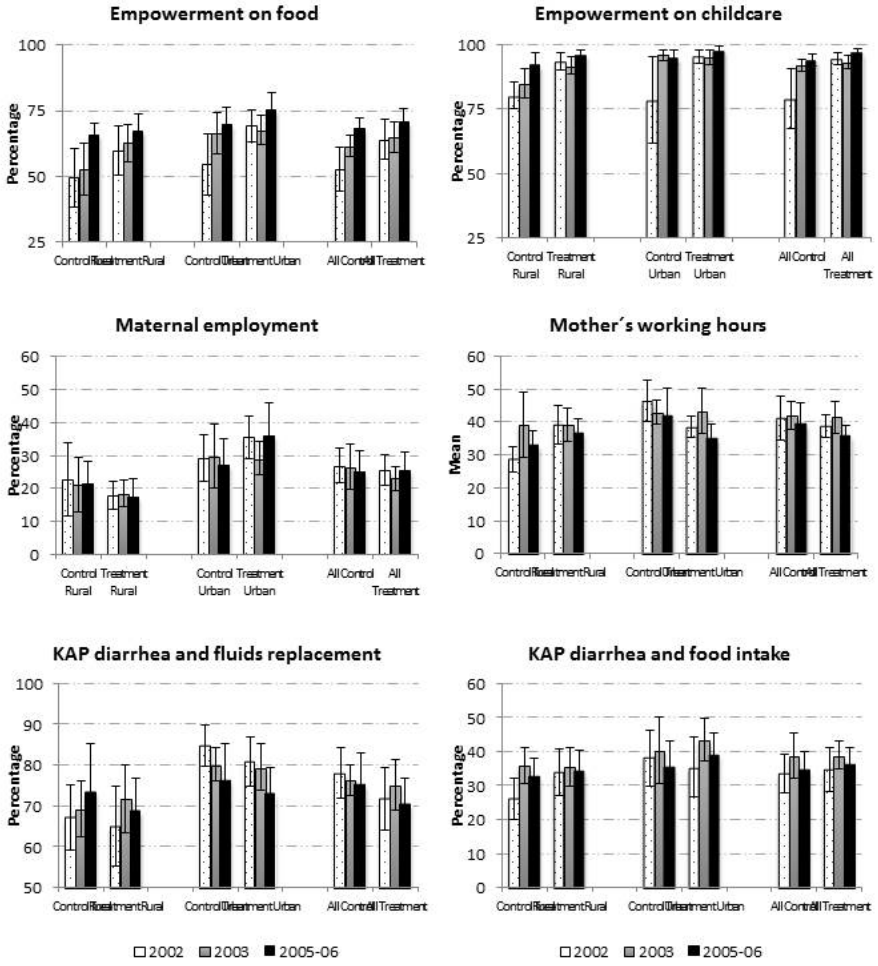
Fruit consumption: Raisins or grapes, bananas, watermelon, apples or pears, oranges, grapefruit, strawberries, blueberries, plums

Figure 4 Trends in child´s dietary diversity, Familias en Accion, Colombia, 2002-2006



Error bars are 95% confidence intervals

Figure 5 Trends in women´s empowerment, maternal employment, knowledge, attitudes and practices, Familias en Accion, Colombia, 2002-2006



Error bars are 95% confidence intervals

Empowerment on food and childcare: The mother and both (mother and father) decide how much is spent on food and when to take a child to the doctor if sick.

KAP (knowledge, attitudes and practices): refers to mother´s information about their knowledge, attitudes and practices concerning diarrhoea and fluids replacement and diarrhoea and food consumption.

ONLINE SUPPLEMENTARY MATERIAL

Table S1 Baseline characteristics by attrition, *Familias en Accion* conditional cash transfer programme, 2002

Characteristics	Remain in the follow-up	Lost to follow-up	p- value
Child characteristics			
Female (%)	49.4	48.6	0.57
Age, years (mean [SD])	4.4 (1.3)	5.1 (1.5)	**<.0001**
Mother´s age, years (mean [SD])	31.8 (7.2)	31.9 (7.6)	0.62
Mother's Education			
Lowest or not education (%)	80.9	81.0	0.97
Municipality characteristics			
Population (< 5,000 (n [%]))	31.8	31.3	0.48
Population (5,000- 14,000 (n [%]))	37.7	35.1	
Population (> 14,000 (n [%]))	30.5	33.6	
Atlantic region (n [%])	41.0	36.0	**0.02**
Eastern region (n [%])	18.8	24.9	
Central region (n [%])	27.2	25.6	
Pacific region (n [%])	13.1	13.6	
Healthcare centres by level of care			
Outpatient care	34 (94.4)	15 (23.4)	0.83
Inpatient care	2 (5.6)	49 (76.6	
Conditionalities			
Healthcare services use (%)[a]	22.6	17.5	**0.001**
Registered in growth and development programme (%)[b]	42.1	32.9	**< 0.001**
Mother´s workshop attendance [c]			
Diarrhoea workshop (%)	23.5	19.2	**0.003**
Prenatal care workshop (%)	16.8	13.3	**0.02**
Acute respiratory infection (%)	18.3	15.6	0.07
Nutrition(%)	23.6	19.8	**0.01**
Behaviours not directly related to conditionalities			
Diversity score			
Low diversity	32.9	33.9	0.17
Average diversity	32.6	34.6	
High diversity	34.5	31.6	

Mother´s empowerment			
If a child is getting sick who decide to go to the doctor Mother or both decide *(%)*	86.2	83.8	0.05
Who decides how much is spent on food Mother or both decide *(%)*	58.9	56.5	0.15
Maternal employment *(%)*	25.9	27.4	0.30
Mother´s working hours (mean [SD])	10.0 (18.4)	10.1 (19.6)	0.14
Mother´s knowledge, attitudes and practices			
Increase fluids replacement during diarrhoea episode (%)	72.6	66.3	**< 0.001**
Received same quantity of food during diarrhoea episode (%)	34.2	35.8	0.36